

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for configuring multiple resources in a system, wherein each resource ~~is capable of being configured by~~ has at least one API command that can be called to configure that resource, comprising:
 - associating multiple elements ~~associated with that resource~~ the resources, each element ~~configuring~~ calling selected API commands for one resource in order to configure that resource in a manner different from other elements;₁₇
 - ~~comprising:~~
 - receiving a user request for an operation that requires separately configuring multiple resources in the system;
 - in response to the user request, selecting a service configuration policy that implements a predetermined service quality;
 - using the service configuration policy to communicate commands to a selected element for each resource;
 - for each element receiving at least one of the communicated commands, performing:
 - (i) interpreting the received command;
 - (ii) calling at least one API command for its associated resource in order to configuring configure its associated resource as requested by the received command, wherein all resource configurations performed by all the elements in response to receiving the commands implement the user requested operation with the predetermined service quality.

- 1 2. (Previously Presented) The method of claim 1, wherein the user requested
2 operation comprises a request to allocate at least one resource in the system to
3 a host in the system.
- 1 3. (Original) The method of claim 2, wherein the request to allocate the at least one
2 system resource comprises a request to allocate additional storage space in the
3 system to the host.
- 1 4. (Original) The method of claim 3, wherein the request to allocate the at least one
2 system resource includes a request to allocate the storage space to a logical
3 volume in the host, wherein the resources managed by the elements comprise a
4 storage device, a switch, a host adaptor, file system, and a volume manager,
5 wherein the element managing the storage device allocates the storage space to
6 the host, wherein the element managing the switch is capable of allocating at
7 least one path in the switch to the storage device to allow the host to access the
8 allocated storage space, wherein the element managing the host adaptors
9 allocates at least one host adaptor in the host to communicate with the switch to
10 access the allocated storage space, and wherein the element managing the
11 volume manager assigns the allocated storage space in the device to the
12 requested logical volume used by the host.
- 1 5. (Original) The method of claim 4, wherein the system is capable of including
2 multiple storage devices, switches, and host adaptors in the host, and wherein
3 there is at least one separate element to manage each storage device and
4 switch in the system.
- 1 6. (Original) The method of claim 5, further comprising:
2 in response to the communicated commands, determining, with the
3 elements, at least one switch and storage device in the system capable of
4 supplying the storage and path resources to satisfy the user request, wherein the

5 commands are communicated to the elements managing the determined
6 switches and storage devices.

7.-8. (Canceled).

1 9. (Original) The method of claim 1, wherein the commands are
2 communicated by using element proxy objects registered with a lookup
3 service.

1 10. (Currently Amended) A method for managing multiple resources in a system,
2 wherein each resource ~~is capable of being configured by~~ has an API proxy object
3 with at least one API command that can be called to configure that resource,
4 comprising:

5 associating multiple elements with the resources, each element
6 configuring calling selected API commands for one resource in order to configure
7 that resource in a manner different from other elements; ~~comprising:~~

8 registering a configuration service proxy object with a lookup service,
9 wherein the configuration service proxy object includes code enabling access to
10 a configuration service capable of configuring resources in the system to produce
11 a predetermined service quality;

12 registering configuration element proxy objects with the lookup service,
13 wherein the configuration element proxy objects include code enabling access to
14 element configurations that are capable of configuring system resources;

15 using the code in the configuration proxy object to communicate a user
16 request for a configuration operation with respect to at least one system resource
17 to the configuration service; and

18 using, with the configuration service, the code in the configuration element
19 proxy objects to communicate commands to a selected one of the configuration
20 elements for each resource to implement the requested configuration operations
21 with the requested quality of service; and

22 in response to receiving the commands from the configuration service,
23 ~~performing, with the configuration elements, a configuration operation on the~~
24 ~~resource indicated in the received command~~each selected configuration
25 element calling at least one API command for its associated resource in order to
26 configure its associated resource as requested by the received command.

1 11. (Original) The method of claim 10, wherein all the configuration operations
2 performed by all the configuration elements in response to receiving commands
3 from the configuration service implement the user requested configuration
4 operation.

1 12. (Original) The method of claim 10, wherein the user requested configuration
2 operation comprises a request to allocate a resource in the system to a host in
3 the system, and wherein the configuration operations performed by the
4 configuration elements receiving the commands from the configuration service
5 implement the user requested resource allocation.

1 13. (Original) The method of claim 12, wherein the user requested resource
2 allocation comprises a request to allocate more storage space in the system to
3 the host.

1 14. (Original) The method of claim 10, wherein the request to allocate the system
2 resource includes a request to allocate the storage space to a logical volume in
3 the host, wherein the resources managed by the configuration elements
4 comprise a storage device, a switch, a host adaptor, and a volume manager,
5 wherein the configuration element managing the storage device allocates the
6 storage space to the host, wherein the configuration element managing the
7 switch is capable of allocating one or more paths in the switch to the storage
8 device to allow the host to access the allocated storage space, wherein the
9 configuration element managing the host adaptors is capable of allocating one or
10 more host adaptors to access the allocated storage space through the switch,

11 and wherein the configuration element managing the volume manager assigns
12 the allocated storage space to the requested logical volume.

1 15. (Original) The method of claim 10, wherein the system is capable of including
2 multiple storage devices, switches, and host adaptors in the host, and wherein
3 there is at least one separate configuration element to manage each storage
4 device and switch in the system.

1 16 (Original) The method of claim 15, further comprising:
2 in response to the user request, determining, with the configuration
3 elements, at least one switch, storage device, and host adaptor in the system
4 capable of supplying the storage and path resources to satisfy the user
5 request, wherein the configuration elements configure the determined switches
6 and storage devices.

1 17. (Original) The method of claim 16, wherein the configuration elements query
2 information on the system components to determine the system components
3 capable of satisfying the user requested configuration operation.

1 18. (Original) The method of claim 16, wherein configuration policy parameters
2 are provided with each configuration element that specify how each
3 configuration element configure the associated switch, storage device, or host
4 adaptor.

1 19. (Original) The method of claim 18, wherein the configuration policy
2 parameters specify a level of availability to provide with the allocated
3 storage space.

1 20. (Original) The method of claim 14, wherein there are multiple configuration
2 services calling different sets of elements to provide different qualities of
3 configurations, further comprising:

4 selecting one of the configuration services.

1 21. (Original) The method of claim 14, wherein the system is further capable of
2 including backup programs and snapshot image programs, wherein there is at
3 least one configuration element to manage each backup program and
4 snapshot image program in each host.

22.-23. (Canceled).

1 24. (Original) The method of claim 10, wherein the configuration service proxy
2 object enables either remote or local access to the configuration service to
3 configure capable of configuring resources in the system.

1 25. (Currently Amended) A method for configuring multiple resources in a system,
2 wherein each resource ~~is capable of being configured by~~ has at least one API
3 command that can be called to configure that resource, comprising:
4 associating multiple elements associated with that resource the resources,
5 each element configuring calling selected API commands for one resource in
6 order to configure that resource in a manner different from other elements;
7 ~~comprising:~~
8 invoking a management program;
9 providing the management program a set of user specified operational
10 parameters to use for a configuration operation performed with respect to the
11 system resources;
12 selecting with the management program a service configuration policy that
13 implements a predetermined service quality;
14 calling, with the service configuration policy a selected element for each
15 resource;
16 for each element called by service configuration policy, performing:
17 (i) interpreting the received command;

18 (ii) calling at least one API command for its associated resource in
19 order to configuring configure its associated resource as requested
20 by the received command , wherein the elements configure the
21 resources according to the service configuration policy to provide
22 the requested service quality.

1 26. (Original) The method of claim 25, wherein the user specified operational
2 parameters comprise a request to allocate at least one resource in the system to
3 a host in the system, wherein the element operations comprise configuration
4 operations to configure the managed resources to implement the user specified
5 resource allocation.

1 27. (Original) The method of claim 26, wherein the request to allocate the at least
2 one system resource comprises a request to allocate additional storage space in
3 the system to the host.

1 28. (Original) The method of claim 27, wherein the request to allocate the at least
2 one system resource includes a request to allocate the storage space to a
3 logical volume in the host, wherein the resources managed by the elements
4 comprise a storage device, a switch, a host adaptor, file system, and a volume
5 manager, wherein the element managing the storage device allocates the
6 storage space to the host, wherein the element managing the switch is capable
7 of allocating at least one path in the switch to the storage device to allow the
8 host to access the allocated storage space, wherein the element managing the
9 host adaptors allocates at least one host adaptor in the host to communicate
10 with the switch to access the allocated storage space, and wherein the
11 element managing the volume manager assigns the allocated storage space in
12 the device to the requested logical volume used by the host.

1 29. (Original) The method of claim 28, wherein the system is capable of including
2 multiple storage devices, switches, and host adaptors in the host, and wherein

3 there is at least one separate element to manage each storage device and
4 switch in the system.

30. (Canceled).

1 31. (Previously Presented) The method of claim 25, wherein there are multiple
2 management programs, wherein each management program calls one of the
3 multiple elements for each resource to control, and wherein different
4 management programs call different elements for at least one resource to
5 perform different operations with respect to the resource.

1 32. (Currently Amended) A system for configuring multiple resources,
2 wherein each resource ~~is capable of being configured by~~ has at least
3 one API command that can be called to configure that resource,
4 comprising:

5 means for associating multiple elements associated with that
6 resource the resources, each element configuring calling selected
7 API commands for one resource in order to configure that resource
8 in a manner different from other elements; ~~comprising:~~

9 ~~multiple resources;~~

10 means for receiving a user request for an operation that
11 requires separately configuring multiple resources in the system;

12 means for selecting, in response to the user request, a service
13 configuration policy that implements a predetermined service policy;

14 means for using the service configuration policy to communicate
15 commands to a selected element for each resource;

16 ~~multiple element means for performing,~~ in response to receiving at least
17 one of the communicated commands, one of the multiple elements interpreting
18 the received command and ~~configuring~~ calling at least one API command for its
19 associated resource in order to configure its associated resource as requested
20 by the received command, wherein all resource configurations performed by all

21 the elements in response to receiving the commands implement the user
22 requested operation with the predetermined service quality.

1 33. (Previously Presented) The system of claim 32, wherein the user requested
2 operation comprises a request to allocate at least one resource in the system to
3 a host in the system.

1 34. (Original) The system of claim 33, wherein the request to allocate the at least
2 one system resource comprises a request to allocate additional storage space
3 in the system to the host.

1 35. (Original) The system of claim 34, wherein the request to allocate the at least
2 one system resource includes a request to allocate the storage space to a
3 logical volume in the host, wherein the resources managed by the elements
4 comprise a storage device, a switch, a host adaptor, file system, and a volume
5 manager, wherein the element managing the storage device allocates the
6 storage space to the host, wherein the element managing the switch is capable
7 of allocating at least one path in the switch to the storage device to allow the
8 host to access the allocated storage space, wherein the element managing the
9 host adaptors allocates at least one host adaptor in the host to communicate
10 with the switch to access the allocated storage space, and wherein the element
11 managing the volume manager assigns the allocated storage space in the
12 device to the requested logical volume used by the host.

1 36. (Original) The system of claim 35, wherein the system is capable of including
2 multiple storage devices, switches, and host adaptors in the host, and wherein
3 there is at least one separate element means to manage each storage device
4 and switch in the system.

1 37. (Original) The system of claim 36, wherein the multiple element means further
2 perform:

3 determining at least one switch and storage device in the system capable
4 of supplying the storage and path resources to satisfy the user request, wherein
5 the commands are communicated to the elements managing the determined
6 switches and storage devices.

38.-39. (Canceled).

1 40. (Original) The system of claim 32, wherein the commands are communicated by
2 using element proxy objects registered with a lookup service.

1 41. (Currently Amended) An article of manufacture comprising a computer readable
2 medium with computer readable program code thereon including code for
3 configuring multiple resources in a system, wherein each resource ~~is capable of~~
4 ~~being configured by~~ has at least one API command that can be called to
5 configure that resource, by:
6 associating multiple elements associated with that resource the resources,
7 each element configuring calling selected API commands for one resource in
8 order to configure that resource in a manner different from other elements; ~~by:~~
9 receiving a user request for an operation that requires separately
10 configuring multiple resources in the system;
11 in response to the user request, selecting a service configuration policy
12 that implements a predetermined service quality;
13 using the service configuration policy to communicate commands to a
14 selected element for each resource;
15 for each element receiving at least one of the communicated commands,
16 performing:
17 (i) interpreting the received command;
18 (ii) calling at least one of the API commands for its associated
19 resource in order to configuring configure its associated resource
20 as requested by the received command, wherein all resource
21 configurations performed by all the elements in response to

22 receiving the commands implement the user requested operation
23 with the predetermined service quality.

1 42. (Previously Presented) The article of manufacture of claim 41, wherein the user
2 requested operation comprises a request to allocate at least one resource in the
3 system to a host in the system.

1 43. (Original) The article of manufacture of claim 42, wherein the request to allocate
2 the at least one system resource comprises a request to allocate additional
3 storage space in the system to the host.

1 44. (Original) The article of manufacture of claim 43, wherein the request to allocate
2 the at least one system resource includes a request to allocate the storage space
3 to a logical volume in the host, wherein the resources managed by the elements
4 comprise a storage device, a switch, a host adaptor, file system, and a volume
5 manager, wherein the element managing the storage device allocates the
6 storage space to the host, wherein the element managing the switch is capable
7 of allocating at least one path in the switch to the storage device to allow the host
8 to access the allocated storage space, wherein the element managing the host
9 adaptors allocates at least one host adaptor in the host to communicate with the
10 switch to access the allocated storage space, and wherein the element managing
11 the volume manager assigns the allocated storage space in the device to the
12 requested logical volume used by the host.

1 45. (Original) The article of manufacture of claim 44, wherein the system is
2 capable of including multiple storage devices, switches, and host adaptors in
3 the host, and wherein there is at least one separate element to manage each
4 storage device and switch in the system.

1 46. (Original) The article of manufacture of claim 45, further comprising:

2 in response to the communicated commands, determining, with the
3 elements, at least one switch and storage device in the system capable of
4 supplying the storage and path resources to satisfy the user request, wherein the
5 commands are communicated to the elements managing the determined
6 switches and storage devices.

47.-48. (Canceled).

1 49. (Original) The article of manufacture of claim 41, wherein the commands are
2 communicated by using element proxy objects registered with a lookup service.

1 50. (Currently Amended) An article of manufacture comprising a computer readable
2 medium with computer readable program code thereon including code for
3 managing multiple resources in a system, wherein each resource ~~is capable of~~
4 being configured by has at least one API command that can be called to
5 configure that resource by:
6 associating multiple elements associated with that resource the resources,
7 each element configuring calling selected API commands for one resource in
8 order to configure that resource in a manner different from other elements; by:
9 registering a configuration service proxy object with a lookup service,
10 wherein the configuration service proxy object includes code enabling access to
11 a configuration service capable of configuring resources in the system to produce
12 a predetermined service quality;
13 registering configuration element proxy objects with the lookup service,
14 wherein the configuration element proxy objects include code enabling access to
15 element configurations that are capable of configuring system resources;
16 using the code in the configuration proxy object to communicate a user
17 request for a configuration operation with respect to at least one system resource
18 to the configuration service;
19 using, with the configuration service, the code in the configuration element
20 proxy objects to communicate commands to a selected one of the configuration

21 elements for each resource to implement the requested configuration operations
22 with the requested quality of service; and
23 in response to receiving the commands from the configuration service,
24 ~~performing, with the configuration elements, a configuration operation on one of~~
25 the multiple elements calling at least one API command for its associated
26 resource in order to configure its associated resource the resource indicated in
27 the received commands.

1 51. (Original) The article of manufacture of claim 50, wherein all the configuration
2 operations performed by all the configuration elements in response to receiving
3 commands from the configuration service implement the user requested
4 configuration operation.

1 52. (Original) The article of manufacture of claim 50, wherein the user requested
2 configuration operation comprises a request to allocate a resource in the system
3 to a host in the system, and wherein the configuration operations performed by
4 the configuration elements receiving the commands from the configuration
5 service implement the user requested resource allocation.

1 53. (Original) The article of manufacture of claim 52, wherein the user requested
2 resource allocation comprises a request to allocate additional storage space in
3 the system to the host.

1 54. (Original) The article of manufacture of claim 50, wherein the request to allocate
2 the at least one system resource includes a request to allocate the storage space
3 to a logical volume in the host, wherein the resources managed by the
4 configuration elements comprise a storage device, a switch, a host adaptor, file
5 system, and a volume manager, wherein the configuration element managing the
6 storage device allocates the storage space to the host, wherein the configuration
7 element managing the switch is capable of allocating one or more paths in the
8 switch to the storage device to allow the host to access the allocated storage

9 space, wherein the configuration element managing the host adaptors is capable
10 of allocating one or more host adaptors to access the allocated storage space
11 through the switch, and wherein the configuration element managing the volume
12 manager assigns the allocated storage space to the requested logical volume.

1 55. (Original) The article of manufacture of claim 50, wherein the system is
2 capable of including multiple storage devices, switches, and host adaptors in
3 the host, and wherein there is at least one separate configuration element to
4 manage each storage device and switch in the system.

1 56 (Original) The article of manufacture of claim 55, further comprising:
2 in response to the user request, determining, with the configuration
3 elements, at least one switch, storage device, and host adaptor in the system
4 capable of supplying the storage and path resources to satisfy the user
5 request, wherein the configuration elements configure the determined switches
6 and storage devices.

1 57. (Original) The article of manufacture of claim 56, wherein the configuration
2 elements query information on the system components to determine the system
3 components capable of satisfying the user requested configuration operation.

1 58. (Original) The article of manufacture of claim 56, wherein configuration policy
2 parameters are provided with each configuration element that specify how
3 each configuration element configure the associated switch, storage device,
4 or host adaptor.

1 59. (Original) The article of manufacture of claim 58, wherein the configuration
2 policy parameters specify a level of availability to provide with the allocated
3 storage space.

1 60. (Original) The article of manufacture of claim 54, wherein there are multiple
2 configuration services calling different sets of elements to provide different
3 qualities of configurations, further comprising:
4 selecting one of the configuration services.

1 61. (Original) The article of manufacture of claim 54, wherein the system is further
2 capable of including backup programs and snapshot image programs, wherein
3 there is least one configuration element to manage each backup program and
4 snapshot image program in each host.

62.-63. (Canceled).

1 64. (Original) The article of manufacture of claim 50, wherein the configuration
2 service proxy object enables either remote or local access to the configuration
3 service to configure capable of configuring resources in the system

1 65. (Currently Amended) A computer readable medium including data structures for
2 configuring multiple resources in a system, wherein each resource ~~is capable of~~
3 ~~being configured by~~ has at least one API command that can be called to
4 configure that resource, comprising:

5 multiple elements associated with ~~that resource~~ the resources, each
6 element ~~configuring~~ calling selected API commands for one resource in order to
7 configure that resource in a manner different from other elements; ~~comprising:~~

8 a manager object which selects a service configuration policy that
9 implements a predetermined service quality, the service configuration policy
10 including multiple commands that together separately configure multiple
11 resources in the system; and

12 multiple element objects, wherein each element object configures one of
13 the resources in the system, wherein the service configuration policy
14 communicates commands to a selected element for each resource, wherein
15 each element receiving at least one of the communicated commands interprets

16 the received command and calls at least one of the API commands for its
17 associated resource in order to ~~configures~~ configure its associated resource as
18 requested by the received command, wherein all the resource configurations
19 performed by all the elements in response to receiving the commands implement
20 the requested system operation with the predetermined service quality.

1 66. (Previously Presented) The computer readable medium of claim 65, wherein the
2 system operation comprises a request to allocate at least one resource in the
3 system to a host in the system.

67.-68. (Canceled).

1 69. (Original) The computer readable medium of claim 65, wherein the manager
2 object and element objects comprise proxy objects, further comprising:
3 a lookup service including registered instances of the manager proxy
4 objects and element proxy objects, wherein the manager and element proxy
5 objects include code enabling access to the operations performed by the proxy
6 objects.